Radius' Giant Cell Tumor: Allograft with Conservation of Distal Radioulnar Joint

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Abstract

Purpose Giant cell tumor of the distal radius are frequent lesions, and different types of surgeries have been described. Functional results, after conservative treatment or arthrodesis, often find a decreased strength and range of motion. The sacrifice of the distal radioulnar joint could be one of the causes. We report the case of a 26-year-old patient who presented with a Campanacci Grade III giant cell tumor of the distal radius. We managed his case by the association of en bloc resection and allograft reconstruction with the preservation of distal radioulnar joint.

Hypothesis This procedure could improve functional results, without increasing the risk of recurrence at 2 years follow-up.

Case Report The originality of our technique was the possibility of distal radioulnar joint conservation. We preserved a long portion of cortex bone all through the ulnar side of the distal radius. We then used an allograft of distal radius, fixed by a reconstruction anatomical plate.

Results At 2 years follow-up, the range of motion was 100° with 60° of palmar flexion, 40° of extension, 75° of pronation, and 70° of supination. Radial and ulnar inclination were 10 and 15°, respectively. MTS (Musculoskeletal Tumor Society Score) 1993 was 88% and DASH score was 6. Concerning grip strength, it was measured at 85% in comparison with the other side. Pronation and supination strengths were 80 and 73%, respectively, in comparison with the other side. At follow-up, standard X-rays showed no recurrence. The allograft was well integrated.

Conclusion Conservative treatment of the distal radioulnar joint allowed an almost ad integrum recovery, concerning strengths and range of motion. It allows a better functional recovery, without increasing the risk of recurrence.

Keywords

- giant cell tumor
- en bloc resection
- allograft
- distal radioulnar joint

Giant cell tumor of the distal radius are frequent lesions and their treatment in 2017 is not consensual.^{1–4} According to Campanacci grading, different types of surgeries have been described. Intralesional curettage associated with adjuvants or autograft^{1–4} seems to be interesting in Grade I or II, because of the strictly local extension.^{5,6} For Grade III, en bloc resection seems to be necessary to decrease the risk of recurrence.^{1–4}

For joint reconstruction, many techniques have been described, but none of them have been proven to outperform any other.^{1–4} Functional results, after conservative treatment

or arthrodesis, often find a decreased strength and range of motion. The sacrifice of the distal radioulnar joint could be one of the causes.^{1–4,7–12}

We report the case of a 26-year-old patient who presented with a Campanacci Grade III giant cell tumor of the distal radius. We managed his case by the association of en bloc resection and allograft reconstruction with the preservation of distal radioulnar joint. Our work hypothesis was that this procedure could improve functional results, without increasing the risk of recurrence at 2 years follow-up.

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Fig. 1 Standard X-ray of the distal radius in anteroposterior view showing the Campanacci Grade III lesion.

Fig. 2 Computed tomography scan of the distal radius in coronal view.

Case Report

A 26-year-old patient presented with a giant cell tumor of his right distal radius, which was diagnosed after chronic wrist pain. Standard X-rays showed a typical Radiological Campanacci Grade III lesion (►Figs. 1 and 2). A radiological biopsy was performed and the diagnosis was confirmed by two anatomopathologists. The patient was against arthrodesis because he anticipated the lack of postoperative mobility, despite the strength conservation. Then, we decided to practice a conservative treatment, with an allograft of distal radius, to preserve the carporadial joint. The originality of our technique was the possibility of distal radio-ulnar joint conservation. According to the preoperative planification detailed in ►Fig. 3, we preserved a long portion of cortex bone all through the ulnar side of the distal radius. We then removed, in one part, the distal portion of the radius, as detailed in ►Fig. 4. Our hypothesis was that the integrity of triangular fibrocartilage complex could maintain pronosupination strength and high range of motion. We then used an allograft of distal radius, and precisely adapted to the anatomy of the patient (►Figs. 5, 6, 7). Then we fixed the allograft by a reconstruction anatomical plate (►Figs. 8 and 9). To maximize the chance of union, we associated, between the preserved cortex bone at the ulnar side of the distal radius and the ulnar side of the allograft, a cancellous autograft (harvested from anterior iliac crest) (►Fig. 7). Because of radiocarpal articular capsule invasion, we needed to excise this capsule, and fix temporarily the joint with a K-Wire (from radius to scaphoid). This allowed us to keep the joint in the right

position. A plaster cast was applied for 6 weeks. We then removed the cast and the K-Wire and wrist rehabilitation started with a physiotherapist.

Fig. 3 Preoperative planification of the en bloc resection: conservation of the distal radioulnar joint.

Fig. 4 Preoperative planification of the en bloc resection. The black landmarks materialize the resection of the distal radius with conservation of the cortex at the ulnar side of the radius.

Fig. 5 Perioperative view of the radius' allograft: purple drawing of the grafted portion.

Fig. 6 Per operative X-ray of the graft in anteroposterior view before plate fixation: perfect match of the graft, despite distal radioulnar joint preservation.

Fig. 7 Per operative X-ray of the graft in anteroposterior view before plate fixation: detail of the surgical technique, with preserved cortex at the ulnar side of the radius and cancellous autograft between allograft and preserved cortex.

Fig. 8 Per operative X-ray in mediolateral view after plate fixation of the allograft.

Fig. 9 Per operative view of the allograft, fixed by plate.

At 2 years follow-up, clinical results were very encouraging and the patient was very satisfied. The range of motion was 100° with 60° of palmar flexion, 40° of extension, 75° of pronation, and 70° of supination. Radial and ulnar inclination were 10 and 15°, respectively. Musculoskeletal Tumor Society Score 1993 was 88% and DASH score was 6. Concerning grip strength, it was measured with a Jamar Dynamometer (Sammons Preston Rolyan, Bolingbrook, IL), at 85% in comparison with the other side. Pronation and supination strength were measured by a hydraulic Dynamometer (Fabrication Enterprises Inc., Elmsford, NY). They were 80 and 73%, respectively, in comparison with the other side.

At follow-up, standard X-rays showed no recurrence. The allograft was well integrated (► **Figs. 10 and 11**).

Fig. 10 X-ray at follow-up in 3/4 anteroposterior view showing the integration of the graft.

Fig. 11 X-ray at follow-up in mediolateral view showing the integration of the graft.

Discussion

Campanacci Grade I and II giant cell tumor can be managed by conservative treatment with curettage and autograft or synthetic filling.^{1–4} For Grade III, en bloc resection is needed to decrease risks of extension and recurrence.^{1–3} The gold standard also includes a reconstruction procedure, which depends on surgery team's habits.^{1–3} Arthrodesis seems to be the most practiced procedure, especially because strength is often maintained.^{9,13–16} Autograft remains the gold standard to reconstruct small loss of bone. For loss of bone greater than 10 cm, vascularized fibular graft is indicated, especially combined with a soft tissue graft if needed.^{9,10,13–16}

In this case, we decided to keep the mobility of the radiocarpal joint, to preserve patient's range of motion. We chose allograft because we needed to keep an articular surface opposite to the patient's carpus. Indeed, literature finds good results with allograft in terms of functional outcome and recurrence rate. Bone union of allograft may be helped by the use of autograft (cancellous or cortex), increasing the chance of bone ingrowth near the allograft.^{8,11}

In terms of range of motion, it clearly appears that conservative treatment gives better results in comparison with arthrodesis.^{2–4,7,9,10,12–15,17} However, results seem to be independent of the choice between allo- or autograft.^{2–4,7,9,10,12–15,17} In our case, conservative treatment of the distal radioulnar joint allowed a very satisfying recovery, because the range of motion was 100°. This seems to be superior in comparison with the literature datas.^{7,10,12}

In terms of grip strength recovery, literature reports pretty unpredictable results (with arthrodesis or conservative treatment). Postoperative grip strength is reported from 41 to 71% in comparison with the other side.^{7,9,12,15} In our case, this data are superior, with 85% of recovery in comparison with the other side.^{7,9,10,12,15} Moreover, this case reports results in terms of pronosupination strength, never studied before in literature.^{7,9,12,15} This postoperative parameters were very good, with respectively 80 and 73% of recovery, concerning pronation and supination strength, always in comparison with the other side. Conservation of the triangular fibrocartilage complex is logically responsible of these very encouraging results, concerning strength's recovery, and also pronosupination range of motion. This last parameter seems to be very good in comparison with the literature.^{7,10,12} However, these encouraging results should be naturally followed and reported in a controlled study for other indications in selected cases.

In terms of recurrence rate at 2 years follow-up, conservative treatment of the distal radioulnar joint seems to have not increased the risk of locoregional recurrence. A more important follow-up will probably ensure this result.

Conclusion

Conservative treatment of the distal radioulnar joint in our patient allowed an almost ad integrum recovery, concerning

strengths and range of motion. When the giant cell tumor preserves distal radioulnar joint, our technique remains a good alternative treatment. It allows a better functional recovery, without increasing the risk of recurrence. Preservation of native distal radioulnar joint and triangular fibrocartilage complex seems to improve functional outcome. However, a more important follow-up and other similar case remain necessary to confirm these very encouraging results.

Conflict of Interest

None declared.

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